INFORMATION FOR PLAYERS, OWNERS, DEALERS AND MAKERS OF BOW-INSTRUMENTS, ALSO FOR STRING-MANUFACTURERS

TAKEN FROM PERSONAL EXPERIENCE, STUDIES AND OBSERVATIONS

With Illustrations of
A Stainer and a Guarnerius Violin, etc.

BY

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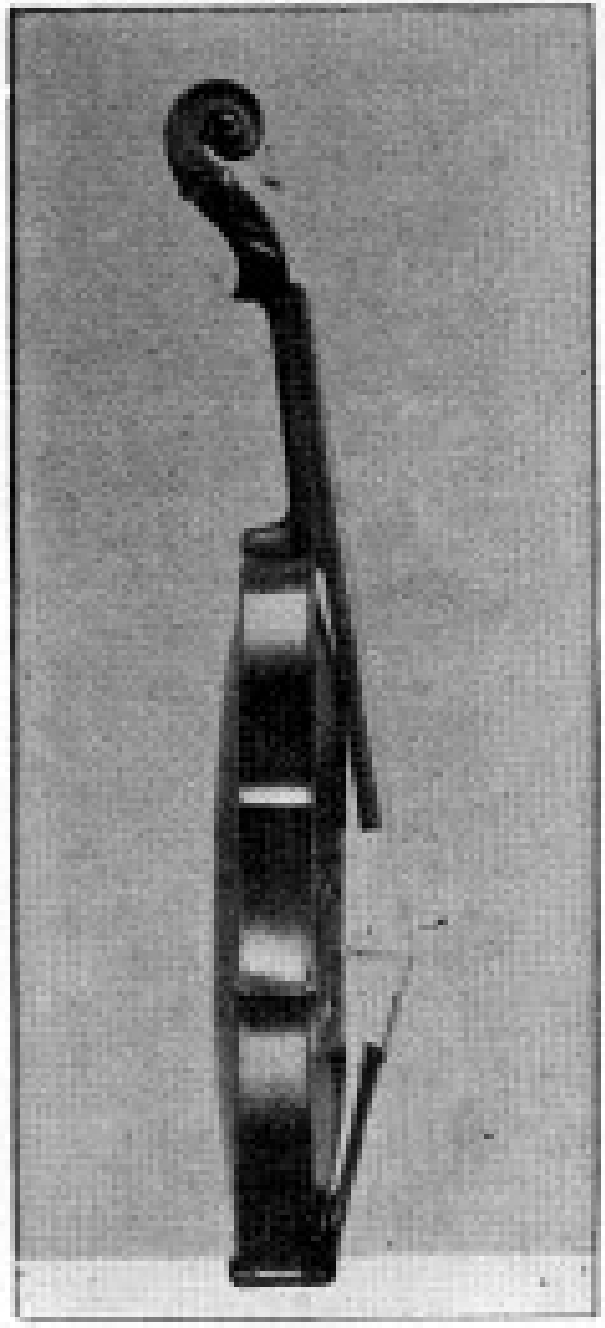

JACOBUS STAINER, 1675.

JOSEPH GUARNERIUS DEL GESU, 1733.

JOSEPH GUARNERIUS DEL GESU, 1733.

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Information for Players, Owners, Dealers and Makers of Bow-Instruments.

I.

Introduction.

VERY frequently one finds String Instruments, which show directly by their outward appearance that their owners do not belong to that estimable class of human beings who are special lovers of order. If one minutely inspects such an instrument, it presents to the eye first of all a covering of dust, caused by the use of rosin, which being in its greater part already condensed

Introduction.

to a crust, disfigures the surface of the violin; the other parts of the instrument are soiled, especially the bridge, which distinguishes itself by black sticky spots. Frequently the strings fail to present a tempting appearance to the touch, and it is only with reluctance that one at last decides to test the instrument.

Neglect of instruments

The permanent neglect of an instrument has not only a bad influence upon its tone, but in the end will be the cause of its ruin. This fact should never be forgotten, as it is undoubtedly the moral duty of each generation to transmit to its successor all valuable instruments in as perfect a condition as possible. For this reason it should be the business of each player to consider any good instrument he may happen to own, as placed in his trust for the benefit of those who succeed him.

Introduction.

Although there are some who in every respect take care of their instruments and thereby give much delight and satisfaction to any connoisseurs who may inspect them, yet there are many who are contented with a lower grade of cultivation.

Again, there is a numerous body of players who desire to keep their property in good order and free from damage, but who are not certain as to the best method to be pursued in order to secure a satisfactory result. One cannot wonder at this, because when a pupil is taught to play an instrument, he is indeed shown how to handle it, but about its structure and the function and nature of each part he generally hears but little or nothing.

Pianists and Violinists.

How many pianists are there, for instance, who have scarcely ever seen the inside of a piano and how many violinists, who are with regard to

Introduction.

the formation and treatment of the instrument in a remarkable state of ignorance, the more so, as in respect of bow-instruments much is considered as still involved in obscurity.

First of all it should be impressed on every violinist, that dust and damp do harm to the body of a violin, especially dust, which facilitates the entrance of damp.

On the other hand, if we admit that a pianist cannot dispense with the assistance of others, in respect to the tuning, stringing etc. of the instrument, it is otherwise in the case of a player on the violin. The violinist must himself be able to tune and string his instrument, and to undertake several other manipulations which are necessary for its full regulation and management. To enable him to do this, much intelligence, practical instruction, and experience are absolutely necessary.

Introduction.

He ought in all cases to endeavour to understand every part of his instrument, in order that he may occasionally confer if possible with the maker, and express to him clearly his wishes as to necessary repairs. The violin is a very delicate subject, and every one who loves his instrument and esteems it must have the decidedly natural wish, to overlook its repairs For this much knowledge and acquaintance with detail are required and those must be strengthened in every possible way as opportunities occur. A number of works on violin-building are already in existence, but in studying them it must always be borne in mind, that the most modern are not always the best. The whole tendency of our times is towards novelty, and the most valuable hints found in the older works are too frequently considered as being *obsolete*. Nevertheless, really obsolete views are

Literature.

Introduction.

retained with such persistent obstinacy, that easy going people accept them without reflection, whereas, if they would carefully compare the new ideas with the old, they would find that the latter have little to recommend them except the oft-repeated dogmatic assertions of their advocates.

Spohr.

For example, people are always upholding what Spohr has said in his "Violin School" about violins and their treatment, notwithstanding that what he has said on this subject is not always infallible. There are even errors to be found in his doctrines.

One cannot deny to Spohr's teaching the preference for a precise form, and he has always taken trouble as far as it was in his power to work for the thing itself; but all investigations and all efforts in the domain of violin-building, and the progress of historical knowledge in that respect since 1833 have

Introduction.

not been without practical results; on the contrary, there has been great and thorough progress, but also many useless and unpractical inventions have appeared and unfortunately their effect has not disappeared quite so quickly.

Old and new instruments.

It is not always easy to free oneself from certain prejudices. For instance there are many who consider it right under all circumstances to prefer Italian instruments of moderate value (and a great number of that kind exist) to the best instruments of any other nationality. Again, others would grant to any old instrument, having no other special merit than that of age, a superiority over the best-made instruments of the present day. It is of course an advantage to an instrument to have been much played upon, but a good new violin which has been treated in the right manner, frequently,

Introduction.

in a comparatively short time, surpasses very many old ones.

The excellent productions of highly qualified and even renowned violin-makers of modern times have to suffer from the prevailing prejudice, the result being the production of spurious "old instruments," the demand regulating the supply.

This evil is happily on the decrease, partly because many spurious violins have of late years been detected, and partly for the reason that the better information which is gradually spreading has shown unmistakably that many new productions of the present day are taking very high rank indeed.

Whoever, therefore, is in possession of a good new instrument ought to esteem it highly and take special care of it, and whoever is the fortunate owner of a good old instrument will, without doubt, honour it all the more

if it possesses advantages besides those of age over its new rivals.

But instruments of inferior value also require care, and the simplest as well as the best must be kept in good order and in every respect preserved in a condition that will support and further the efforts of the player. In this lies a great power to enable the player to excel in his performance.

I will now enter into particulars as to the regulations to be observed for keeping a stringed instrument in a state of perfect fitness. In the remarks I am about to make, I shall confine myself to the violin, inasmuch as everything that relates to the violin applies also to the viola, violoncello and the double bass.

Pegs.

Special attention is required for the *pegs*. The small holes in these, which are intended to let the strings through (string-holes), must be placed near to

String-holes.

Pegs.

the middle line of that part of the neck where the strings are, so that the holes in the A-and E-pegs are somewhat to the right, the holes in the D-and G-pegs somewhat to the left of this line: about as much for each peg, as a third of the distance from the middle line to the respective part of the cheeks, so that the strings when drawn in, from the bridge to the peg are, as far as possible, in a straight line. Here it is to be noticed that the D-, A-and E-strings must be put only a little round the pegs. If the holes are bored as described, the strings will never come so near to the cheeks of the violin-head as to impede their free position, or to hinder the easy management of the pegs.

Drawing up the G-string.

The G-string must be placed in such a manner round the peg that it is put first only a little through the string hole; then begin to turn, guiding the string in winding it so that it lies

Pegs.

directly over the end and thereby clinches it. Then one continues turning, guiding the string in such a manner that each winding will lie next to the last, as far as possible. If the string is rather long, one may let it run (after the end is fixed in the manner described) first to the right and then further again to the left, whereby the windings naturally turn over each other. By this manner of drawing up the string, one avoids the annoyance of one end of the string remaining out; it is not for many reasons to be recommended to cut off spun strings as one would uncovered ones. Further, it is to be remarked that the string-holes must be sufficiently wide, and that in boring them no sharp edges should be made, because these very easily cut into the strings. Should the pegs have become slippery, so that they do not stand perfectly firm, rub them with chalk; if, on the other

Pegs.

hand, they are too firm in the peg-holes, rub them with a piece of thoroughly dry and very old soap, or with soap and chalk, respectively as required. Other methods, as, for instance, to rub the pegs with rosin, or even to moisten them, are to be much objected to, on account of the effect not being durable. The ends of the pegs should always stand out as little as possible. If the

Filling up the peg-holes.

peg-holes begin to get hollowed out by the turning of the pegs, one must not take thicker pegs, but get a thin black splint of maple glued into the peg-holes. This will prevent the holes getting too large. If, however, thicker pegs were taken, these would in turning wear the holes larger and in time it would be necessary to close up the holes and have new ones bored. By using such inlaid splints, which of course must be neatly worked and put in, and which can also be easily renewed, the head of

Pegs.

the violin will always retain a good appearance.

Form of the heads.

The heads of the pegs are made in different forms; of these the flat as well as the somewhat lofty form I consider to be the most practicable in contrast with those frequently used.

Ornaments.

Any ornaments of the heads of the pegs are naturally a matter of taste, but if added they must be put in very firmly, so that they do not in time become loose and, in consequence, cause a rattling sound or even fall out.

Inventions for tuning.

As regards inventions for tuning, by which the turning of pegs and their remaining firm in their places can be made easier, up to the present time only a few seem to have been brought out. In contrast to the advantages which are gained by their application, stand also the disadvantages which finally show that the usual arrangement

of the pegs is still the simplest and most useful.

Neck.

Further one has to pay proper attention to the *neck* of the violin; briefly for the reason that to apply it perfectly straight to the instrument, that is, in an equal direction with the longitudinal section-line of the belly, is one of the most difficult tasks the maker has to encounter. It is too often the case that instruments are found which in this respect leave much to be desired.

Application.

Proportion.

I certainly do not know who first conceived the unfortunate idea of making the neck of a violin as thin as possible, thereby earning the reproach of having given to the world something especially unpractical. Of late years, however, a return to the proper broader measure for the neck is to be noticed with satisfaction. By this one regains the result of durability, commodious

Neck.

facility for playing and besides this the good influence upon the tone of an instrument.

Finishing of the block.

It is not my experience that the pointed finishing of the block, just where it turns into the real neck, gives help towards the convenient playing of the instrument. A more rounded form seems to me decidedly to be preferred.

Finger-board.

Breadth.

The *fingerboard* must, in its direction to the bridge, have as broad a termination as possible (up to 44 millimetres); it must also have perfect straight side lines and the proper rounding. Besides, it is advantageous to take away from the fingerboard some of the wood under the G-string, in order that this string may not jar in playing. One arranges this in such a way that the fingerboard is sloped at that particular place, or else so that it may show an excavation. Skilful instrument-makers often work it out with the scraper whereby the

Position of the G-string.

Finger-board.

same effect is gained without anything special being seen in the ready made fingerboard. This is done by taking away some wood, scraping in the direction from the nut to the bridge, about as far as the heel of the neck, in a sloping descending line, at first only a little, then more, and gradually less again, so that the excavation thus caused (which must only show a depth of one millimetre), in the direction of the broad end of the fingerboard in an ascending line, will bye and bye disappear again. Such a working out of the finger-board is to be preferred, the more so as it is not necessary that it should only be distributed at that part of the fingerboard which lies under the G-string, but it may at the same time be adopted for the other strings in a comparatively smaller degree, whereby only advantages are caused to them. At the broad side of the fingerboard no

Fingerboard.

string will touch it in vibrating, only further on, nearer to the nut. By this small excavation on the fingerboard a more convenient handling of the instrument will be promoted.

Length.

The length of the fingerboard of the violin must be such that the sum of all notes for each string to be played must represent two octaves and a major third, so that, for example, on the E-string the highest possible note that can be played is G sharp altissimo.

Adjusting

The so-called adjusting of the fingerboard, after long use, is (with reference to the height of the bridge) not to be recommended. In case the surface of the fingerboard becomes uneven, it is advisable to get a new one at once.

Nut.

In regard to the nut, care must be taken that it is sufficiently high and that the chimbs are so situated that the strings are at an equal distance from each other. That the strings may

Finger-board.

Chimbs.

move well in the chimbs, the latter must be kept very clean and be occasionally rubbed with dry soap, such as used for the pegs.

Raising.

To give the fingerboard a higher position by glueing on a fitting piece of wood is decidedly to be avoided, because, in doing this, not only does the neck itself easily become too thick, but it also loses in all its parts its right position to the head, relatively to the belly, although care may have been taken to make it thinner proportionately to the applied wood, as it is certainly in a greater or less degree deprived of its proper form and it will not look well when finished. If it is necessary to change the position of the neck, it must be done in a proper manner, by taking it off and neatly glueing it on again, or by putting on a new neck.

idge.

Bridges are usually made of maple—

Bridge. Material.

unfortunately, because this kind of wood is (contrary to the general supposition) not the best for the purpose—beechwood being much more suitable for that most important part of a violin. Wettengel has already remarked this in his "Compendium of making and repairing all Italian and German violins hitherto in use," page 351. This work was published in the year 1828. He remarks:

Wettengel.

"German bridges are always made of the best, clearest and whitest maplewood, which has been dried for several years, but the Italian bridges of very old, perfectly dry, ashy pale beechwood with many and large spots. Musicians have remarked, that the tone of a violin in general gains by the latter kind of bridge. This softness given to the tone by the bridge, is caused without doubt by the absence of much inner stiffness which is characteristic

Bridge.

of a beechwood bridge, and likewise by the participation of the bridge in producing the tone. So far, nothing has been said about the bridge as a sounding part of the violin but there is no doubt that it helps considerably in producing the tone. That it has, according to the inner stiffness of all its parts, a more than sufficient degree of elasticity for sounding, cannot be doubted, also that by the vibration of the strings it is caused to swing. As in the violin there is nothing which could deaden the vibration of the bridge, one can consequently suppose without any scruple that the bridge assists in producing the tone of a violin, and that a bridge of beechwood must always be preferred to one of maple. Certainly the amount which the bridge contributes in producing the tone of a violin cannot be very considerable, although in every case it is as much as either to

Bridge.

improve the tone or to have a bad influence upon it; otherwise the above mentioned observation by musicians would not have been made."

After numerous practical experiments and experiences I can only join in this opinion. As for the rest, bridges of good beechwood are not easily obtained. Some years ago, after having made the first experiments with such bridges and having gained excellent results, it was desirable to get a larger quantity of them. The manufacturer who was desired to provide bridges of beechwood did not attend to this commission, and, on being asked the reason, replied that he had considered it to be nothing but "a joke." Ultimately when the bridges arrived they were not of much worth. If anyone should wish to test bridges of beechwood, they can be obtained of a good quality and in any breadth desired, from Mr.

Bridge.

Paul Petzold, violin-maker, Chemnitz, Saxony.

Breadth.

The breadth of the bridge is generally too small as it is the custom to let the feet of the bridge end on one side with the sound-bar and on the other with the sound-post; but the centre of the left foot of the bridge must exactly coincide with that middle line of the sound-bar which lies in a longitudinal direction, and the centre of the right foot must unite with that longitudinal section-line of the sound-post which is parallel with that middle line of the belly which lies in the longitudinal direction.

In keeping with this is a very minute description, searching into the subject, given by Wettengel in his before-mentioned work (original edition pages 183-190), where he describes an excellent violin, in which it was to be noticed that the breadth of the bar, the diameter of the sound-post, and the length of

Bridge.

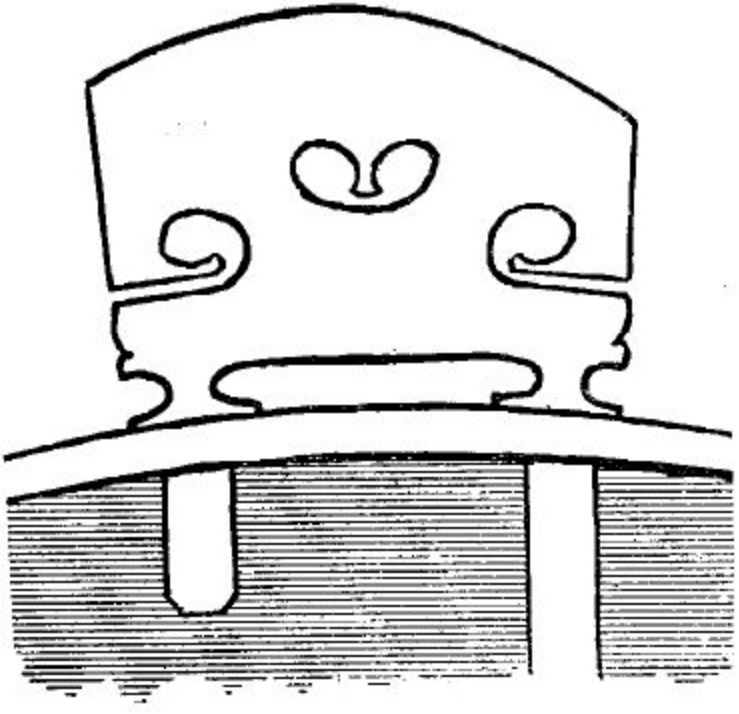
each foot of the bridge were equal, by which the same result was gained in respect to the situation of the feet of the bridge the sound-bar and sound-post.

In our times the feet of the bridge are generally made longer and they should consequently stand out with their inner and outer points on both sides equally over the sound-bar as well as over the sound-post.

If the feet of the bridge are not longer, as has just been explained and as Wettengel describes, then the sound-bar and sound-post will naturally not only be placed exactly in the middle under or behind the respective foot of the bridge, but they will end also with it. Now this ending appears in the course of time to have been erroneously taken as the main point, without taking notice that it depends especially upon the fact that sound-bar and sound-post must have

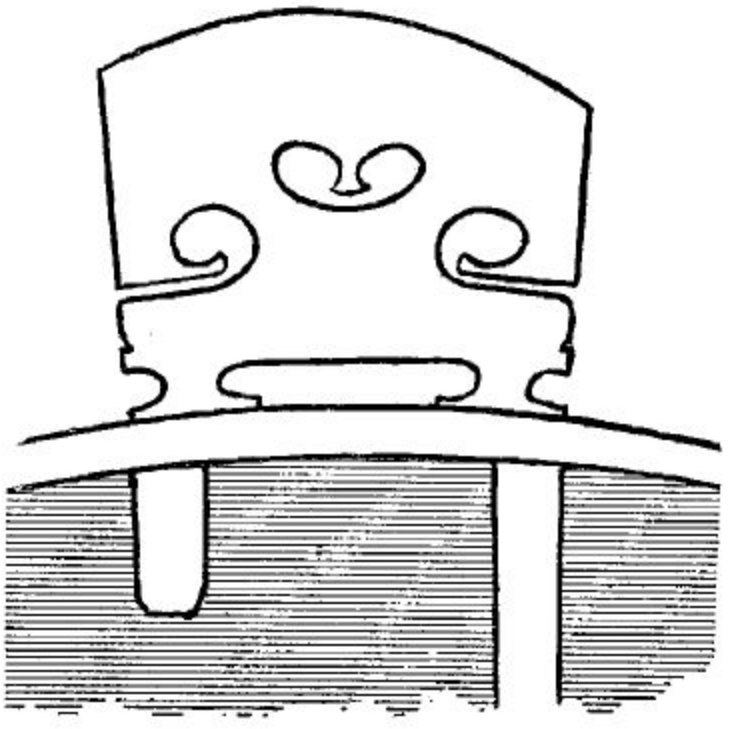
Bridge.

their situation exactly under or relatively behind the middle of the feet of the bridge, consequently in making the feet of the bridge longer, the whole bridge should at the same time have become broader.



Right Breadth of the Bridge.

Bridge.



Wrong breadth of the Bridge.

Moreover, even Spohr remarks that the middle of the left foot of the bridge must stand exactly over the sound-bar. The length of each foot of the bridge is in our days generally eleven millimetres.

Bridge.

The feet themselves must not be worked out to be too fragile, a fault which some thirty years ago was much in vogue, but must have such a thickness that they do not bend towards the roof of the violin; it is only when they rest firm and fit close upon it, that the bridge can properly fulfil its purpose.

Position.

For the rest, it must be placed so that a straight line, which would join the inner cross-cuts of the sound-holes, must run exactly through the middle of the feet of the bridge. The distance of the outer points of the feet of the bridge from the inner cross-cuts of the sound-holes must be at each side exactly equal, provided that the position of the sound-holes is symmetrical. The contrary will seldom be found in reference to the middle of the sound-holes. In consideration of this of course the breadth of the bridge itself must be settled.

Bridge.

If the sound-holes, as sometimes happens, are placed somewhat deeper than usual, the inner cross-cuts of the sound-holes will not be generally in the right place. In that case the bridge must as a rule be placed so that a straight line which would meet the inner cross-cuts of the sound-holes should pass just behind the bridge.

Rounding.

The rounding of the bridge must be such that if a straight line is drawn upon it from the under brim of the G-string to the under brim of the E-string, thus the under brim of the D-string is four millimetres, and the under brim of the A-string $3\frac{1}{2}$ millimetres higher than that drawn line, that is when the chimbs of the bridge, as is usual, have from each other a distance of eleven millimetres; with a smaller distance D and A must be put somewhat lower, with a wider distance accordingly higher.

Bridge.

Chimbs.

The chimbs of the bridge must be made with a fine round file (called a "rat-tail") and should be rubbed often with dry soap in order that the strings may always be easily moved.

Height.

The height of the bridge depends upon the fingerboard. Generally it is advisable to have the bridge as low as possible, because the instrument can be more easily played upon, and besides it loses in tone by the bridge being too high.

If the G-String lies with its under brim (by a proper finishing of the fingerboard under this string) at that end of the fingerboard which is nearest to the bridge, four millimetres over the fingerboard and the E (which, on account of its vibration, may lie much lower than the G), with its under brim three millimetres, a right position of the strings will be obtained.

Weight.

As to the thickness (or heaviness) to

Bridge.

be given to the bridge, that depends chiefly upon the character of tone which the instrument itself has. If it has a particularly soft one, a thinner bridge must be taken, but if it has a sharper tone, a thicker bridge must then be used. The thickness of the bridge must be so chosen, that the characteristic violin tone of the instrument may not be obliterated.

Otto.

Jacob August Otto (1762—1830) speaks about this in his work "On the making of bow-instruments, etc." as follows:—"To facilitate and secure the fitting on of the bridge for each instrument, an idea occurred to me of a plan which I have since made use of, in order to find out a suitable bridge. I weigh the bridge which I wish to adjust to a certain instrument. For this purpose I provide six small blocks of the shape of one of the limbs of a mute, and weigh them one after

Bridge.

another on a gold-scale. The first weighs twelve centigrams, the second 24 centigrams and so on, each of the following ones being always 12 centigrams more, so that the last has a weight of 72 centigrams. If I should now find that the bridge for a single instrument is not suitable, I employ these small pieces in such a manner, that I first choose a bridge which is not very strong and examine if the feet fit quite exactly. If the tone emitted is dull and heavy, the bridge is too thick, and if it is too thin, the tone will be sharp, acute, or too distinct. In each case one can make use of the small blocks; in the first case one changes the bridge and puts on such a thin one, that the tone also becomes sharp and poignant. Then one puts on first the lightest block between the D-and A-string. If by this the tone does not improve, one must instead of the first, which had a weight

Bridge.

of 12 centigrams, put on the second block which has double that weight. In this manner one continues to put on the heavier blocks until the tone is no longer sharp, but round and full. If this result is achieved, one takes a stronger bridge than the one before used and compares its weight on a gold-scale with the first, and, at the same time, with the last applied block, and diminishes the thickness until it has the same weight as the weak bridge and the block together. By many such experiments I have convinced myself that such an experiment has always a good result, and that the purpose of improving the tone will certainly be obtained. Nevertheless, instruments which in respect to their whole quality are not able to produce a good tone, will not be induced by the bridge alone to do so, but by applying the method described, a suitable bridge for each

Bridge.

instrument will at least be found, even for those which are not perfect."

It does not matter whether the bridge may have been made of somewhat harder or softer material, all this will be regulated by finding out the proper *weight*.

In order to prevent the bridge from being easily drawn over by the tension of the strings in tuning, a thing which would in itself cause an unequal pressure of the feet of the bridge, the feet must be placed so that the bridge may slope slightly in the direction of the tail-piece.

In spite of this the bridge will in course of time be drawn over unless other means are taken. In order to keep it as far as possible in its original position, or to replace it in this position, the only proper manipulation is to take hold of the strings one after another, close to the bridge with the thumb and

forefinger of one hand, and then, by pressing the points of these fingers together, to move the upper part of the bridge carefully backwards. Every forcible moving of the bridge is dangerous, because, by this, first, the feet of the bridge may be easily drawn away from their proper place, and, secondly, the bridge may be broken.

Bridge.

Regulation.

The fastening of the *tail-piece* will be best accomplished by a thick string; as this combines solidity with flexibility and adheres well in all its parts. The sling-knot must be burnt at the ends and wrapped round with thread. The little openings in the tail-piece for hanging in the strings must be sufficiently wide, and all sharp edges should be rounded off, because they cut into the strings and easily cause them to break.

Tail-piece.

Fastening.

The small *saddle* between tail-piece and tail-pin should not be too large, or

Saddle.

Violin-holder.

it may be a hindrance in fixing the *violin-holder*.

Form.

Of such there are many different kinds. A violin-holder which may be obtained from Mr. Petzold, the violin-maker before alluded to, has a very practicable form, as it not only permits the violin to rest perfectly firm, but also protects the roof of the instrument in an excellent manner.

Screws.

Violin-holders with only one screw have the disadvantage that they never remain perfectly firm but are liable to turn, and, besides, the pressure of the chin will work upon the violin almost as much as if it had no violin-holder at all; on the contrary, one with two screws will never convey the pressure of the chin direct to the violin.

Tail-pin.

In taking out the *tail-pin*, one must never forget, as well as in replacing it, to compress the belly of the violin with the left hand in that place where the

bridge stands; the back and the roof must be pressed at the same time, the first with the fore and middle finger, the latter with the thumb. By this a moving of the sound-post will be prevented.

Tail-pin.

The *sound-bar* has on an average a breadth of 5 to 6 millimetres. The tension of the bar is regulated principally according to the strength of the roof of the violin. Its position as well as its length varies according to the special opinions of violin-makers.

Sound-bar.

Breadth.

Tension.

Position.

Length.

With nearly every new violin, or one that has recently been repaired, the tone of the middle G, A, or B flat, if played on the G-string, is usually imperfect and dull. Such tones improve in time by playing, so that they only vibrate rather strongly, but otherwise sound well, as in the case of old violins which have been much played upon. If playing does not improve this, an

Sound-bar.

alteration in the position of the sound-bar, or else a new bar, may have a good influence. Also a somewhat heavier bridge under some circumstances may bring about an acceptable result. For instance, if the heavy tone emitted is the B flat, when one plays with a mute the B flat will instantly sound quite clear, but, instead of this, a lower tone, generally the G, will begin to sound heavily.

Heavy utterance of the sound of different tones.

This shows that an increased weight of the bridge, which is here gained by putting on the mute, influences the vibration in such a manner that in this case the tone which was heavily emitted has been almost flattened to the minor third. If we diminish the weight by putting on smaller mutes we have the reverse of the method which Otto had applied in the choice of a proper bridge and can thus cause the heavy tone emitted from G to be gradually

raised higher again. If this succeeds, by bringing it between A and B flat, it will in a way belong to another pitch as the one in which the instrument stands and if also it has not quite vanished from the clear scale it will be moderated. If this has been obtained, one places on the violin another bridge which, in contrast to the one at first in use, is as much heavier as the weight of the last tried mute. If the violin bears the above mentioned experiment without the character of the tone being changed disadvantageously, it may be decidedly recommended as a practical expedient.

Sound-bar.

The *sound-post*, which must exactly adhere to the roof and the back of the violin, has its position close behind the foot of the bridge, so that the back of the bridge ends with the outer line of the sound-post. Concerning the thickness of the sound-post, I have found a

Sound-post.

Position.

Thick-ness.

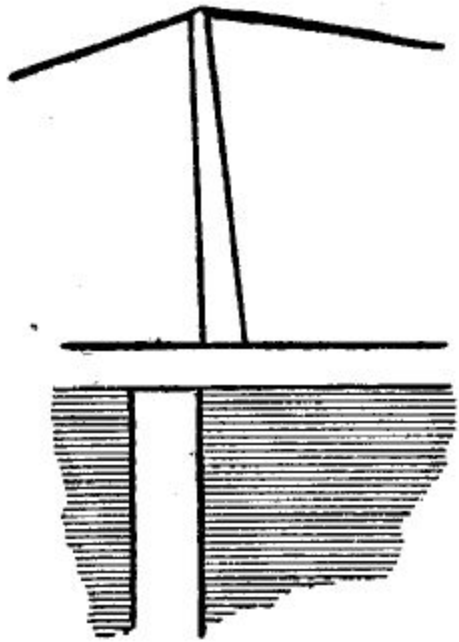
Sound-post.

diameter of six millimetres an equally good proportion for all instruments, no matter how they may differ in structure. I conclude from this that a diameter of 6 millemetres is especially favourable for the function of the sound-post in violins. Whether this or that instrument needs a somewhat stronger or thinner sound-post may well be left undecided.

As has already been mentioned in speaking of the bridge, the middle line of the sound-post referred to must exactly coincide with the middle of the foot of the bridge. The supposition that under certain circumstances the sound-post may advantageously be moved towards the sound-bar, or in an opposite direction to the sound-hole is a false one. It has possibly arisen through the fact that in trying to remedy the tone of a wrong stringed instrument, such a moving of the sound-

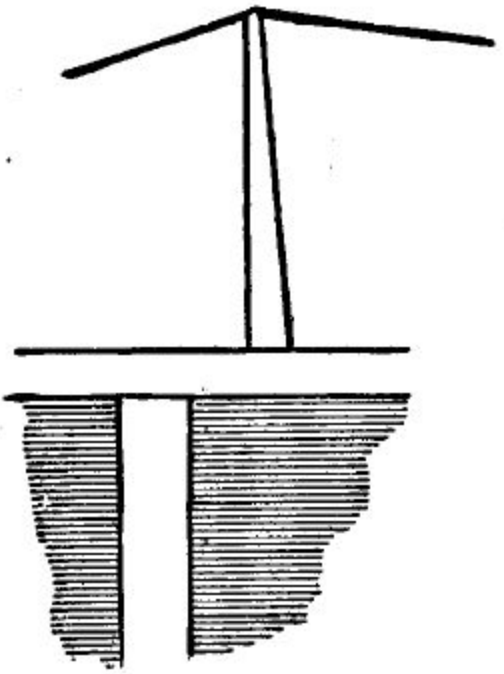
Sound-post.

post shows occasionally an apparently favourable result. This is indeed only apparent, the instrument may have a different sound but it is not really improved. It is the same with moving the sound-post further away from the bridge in the direction of the tail-piece. Only the length of the sound-post is determinative.



Right position of the sound-post.

Sound-post.



Wrong position of the sound-post.

Placing.

The placing of the sound-post so, that its grain is crossed by the grain of the wood which forms the roof, is done (as is well known) to prevent as far as possible the pressure of the sound-post into the roof of the violin. Therefore

Moving

in putting in the sound-post, or in moving it, a thing which must be done with a properly constructed iron-stick,

Sound-post.

in order that the sound-post may remain in its right position, one must pay special attention to the small incision for the iron-stick that it is exactly in the right place, and always remains in a direction straight with the sound-hole. Further one must never neglect to look through the small hole for the tail-pin, to assure one's self that the sound-post stands perfectly perpendicular. A glance through the sound-holes alone is not sufficient, for this reason, that anyone may be very easily exposed to great delusion on this point. It is also to be recommended to look with one eye only through the sound-hole.

Further, one must especially avoid any pressure (such as, for instance, with the knees) towards the ribs as by this the sound-post might be put out of its place or even fall down. If the strings have been taken off, the sound-post must

Sound-post.

be easily movable. If the pressure of the strings upon the bridge and consequently upon the roof, is an exactly symmetrical one (and how this is to be gained will be spoken of later), the violin will then give as full and equable a sound as it is possible for the instrument to do. And now I arrive at a chief point.

Regulation of the tone.

Has the bridge the proper dimensions, is the position of its feet in the before mentioned in due proportion to the bar and sound-post, does the latter stand slightly adhering exactly behind the foot of the bridge, and is the pressure of the strings equal, then all regulations of the tone which might be still necessary have to be made by the sound-post; in this case the only question remaining is whether the sound-post may not be too long or too short. If the tone of the higher strings, especially of the E, is somewhat hard, then the

th.

Sound-post.

sound-post will be too long; if on the contrary the violin loses in intensity, it will be too short. Having this in mind, one can understand a remark of the violin-maker Stoss, of Vienna, who, as Abele tells us in his work ("The Violin, etc."), answered such a question thus: "Leave all speculations; only invent a mechanism by which one can inside the violin shorten or lengthen the sound-post to a hair's breadth, without taking it out, then we shall have succeeded, and more we cannot desire."

Such a mechanism has not yet, to my knowledge, been invented and is not very likely to be, as every mechanical arrangement by which the sound-post "in the violin" could be shortened or lengthened, as for example by screwing, would certainly only have the effect of hemming the tone. Besides this the sound-post at its ends is not even but slanting, and there are other minor

Sound-post.

difficulties which would have to be encountered in devising a mechanism. Probably, therefore, the method which has hitherto usually been adopted for placing the sound-post, will still have to be adhered to. I remark that in the greater number of cases the length of the sound-post will be right, if it adheres only slightly when the strings are taken off, that is, if it can be moved with ease in the longitudinal extension of the violin. This may be looked upon as a rule.

Stringing.

How the stringing of an instrument must be accomplished in order to obtain a perfectly equal pressure of the strings, I have shown in a special essay which appeared in the "Zeitschrift für Instrumentenbau" edited by Paul de Wit in Leipzig. I reproduce it here, by special permission of the publisher, as follows.

II.

On Stringing.

It is an entirely mistaken idea that, when stringing a bow-instrument, the thickness of each string can only be determined by ear, *e.g.*, by experiment. Nevertheless this opinion is widely spread and has descended from one generation to another like the supposition that every virtuoso must likewise be a good teacher. It is even maintained, especially in reference to stringing that each instrument must be studied as a teacher studies the character of a child the better to carry on the work of education. Such ideas as to the management of bow-instruments must be considered as the result of a peculiarly fertile imagination.

On Stringing.

Every player knows that the lower uncovered strings of the violin, viola, etc., must be chosen thicker than the higher ones and that the covered ones must be proportionately thinner, but in reality there is no great clearness among players as to the exact proportional thickness of these strings. For instance we generally find that a violin is strung in such a manner that the higher strings are too thick and the lower ones too thin. The reason for this is the erroneous supposition that the E and A-strings must be thick to give the full tone and D and G rather thin to give a prompt sound. Consequently the pressure of the strings is greater on one half of the instrument than on the other. This is disadvantageous for the instrument as well as for the performer and his audience. The full tone of a violin as well as of all other bow-instruments can *only* be

On Stringing.

brought out *when the pressure of the strings on the instrument is equally distributed.*

In the following pages I will endeavour to explain in what manner this is to be accomplished. To make the matter more simple I will refer only to the violin and will as far as possible proceed not from abstract, but at once from concrete instances.

If we take a cat-gut string and stretch it by hanging on a weight, it will, at a certain length, thickness and weight, produce a certain tone. If we take then the length, that is the sounding part of this string equal to the distance measured from the nut to the bridge of a violin, the thickness of the string being $\frac{3}{4}$ of a millimetre and the weight which stretches this string being about six kilo, we gain (as experiments have shown) the normal A. A second string which has only half the thickness

On Stringing.

will, with the same length and the same weight which the first string had, produce the *Octave* of the first because the quantity is only half. On the same principle the first string produces (*when one only permits the half of it to sound*, playing the higher octave on the A-string) the octave of the fundamental note.

On the other hand, a string which is in comparison with the first mentioned A-string only $\frac{2}{3}$ as thick, will, if it has the same length and weight, produce the fifth of the first, viz., the E above, as is the case when playing the same tone E on the A-string, sounding only $\frac{2}{3}$ of this string. The result is, that for a violin to sound full and free, the E-string must have the same expansion as the A-string and only be $\frac{2}{3}$ as strong as this, or vice-versa *that the A-string must be half as thick again as the E-string.*

On Stringing.

The D must stand in the same relation to the A, viz. the D-string must be half as thick again as the A-string. Likewise the G-string if it should be *uncovered*, must be also half as thick again as the D-string; but such a G-string in proportion to its length would then be too thick. To obviate this, the well-known method is to take a comparatively thin cat-gut string (an A-string is the best) spun over with wire, in order to gain the requisite weight which otherwise could only be had by exceptional thickness.

This covering of the G-string alters the relationship to the other strings very considerably as we shall see further on. We will first continue to discuss the uncovered strings, E, A, and D. A very thick set of strings causes a violin to sound rough and hard, a very thin set on the other hand will cause it to be thin in tone. A medium plan, therefore,

On Stringing.

may be adopted and this will be the case when the diameter of the E-string is taken at $\frac{1}{2}$ millimetre.* Then it follows, as before stated, that the A must be chosen at $\frac{3}{4}$ of a millimetre and the D at $1\frac{1}{8}$ of a millimetre thick a relation which according to prevalent ideas seems to prove the E as thin and the D apparently as too thick, leaving the A about as strong as one generally finds this string. Greater deviations from the given measures cannot well take place as the slightest alterations cause a considerable difference in regard to the proportions of the strings to each other. If, for instance, we were to make the E-string $\frac{6}{10}$ of a millimetre instead of $\frac{5}{10}$ or $\frac{1}{2}$ as is the case at present, the result would be for A $\frac{9}{10}$ and for D $1\frac{7}{20}$ of a millimetre. On the other hand, if the D had

* References to a proper gauge will be made later.

been chosen at only $\frac{9}{10}$ millimetre, the corresponding E-string would be $\frac{4}{10}$ millimetre.

In the first instance it will be seen that the result would be a very thick (even colossal) D-string, in the second instance an E which certainly must be considered as being "too thin." At the same time the result is that the method (in so many instances prevalent) of altering the thickness of a set of strings in an *equally* stronger or weaker degree (for example, each to about one grade) is entirely wrong; thus if the proportion of the strings one to another had been at first right, by such a new adjustment the correct proportion in the stretch when stringing would be upset. For example, suppose the proportions to be according to those before mentioned (E=$\frac{1}{2}$, A=$\frac{3}{4}$ and D=1$\frac{1}{8}$ millimetre), this would then, by division of one

On Stringing.

millimetre into twenty grades, be as E=10, A=15, D=22½ grades.

Again, if each string is now taken *one* grade thicker, E has 11, A 16, and D 23½ grades in diameter, whilst when E is taken at 11 grades, the A must then consequently have 16½ and the D 24¾ grades.

So far concerning the uncovered (not spun) strings, of which the mutual proportion is easy to calculate and not difficult to understand, because, as already mentioned, it is requisite that in stringing a bow-instrument *all the strings must have equal stretch and pressure on the instrument.* It is quite as easy to determine the thickness of the *covered strings in specie* for this reason, that also with these a lower string if it is to produce the fifth must be taken half as thick again as the preceding higher one, because the covered strings being homogeneous *in themselves* stand

Covered Strings.

in the same proportion as uncovered ones; but extraordinary difficulties occur as soon as we wish to calculate in what proportion a covered string stands to an uncovered one if it agrees with the respective conditions. I have confined, therefore, myself entirely to *practical experiments* and have found that the G-string of a violin if it has the same stretch as each of the other strings (the observance of this condition is essential to my argument) *must be chosen just as thick again as the E-string.* Thus when the E-string is $\frac{1}{2}$ millimetre strong, it follows that the thickness of the G-string must amount to *one* millimetre, or, at the same rate, must be one third part stronger than the A.

Such strong G-strings are scarcely to be found and are seldom asked for. I myself had to order some to be specially manufactured. I must not forget to say that in the above as well as in the

On Stringing.

following I refer only to covered strings spun *with thin silver-wire*, and it is specially to be noticed that these remarks apply even to the contrabasso. A string spun with *copper-wire* must be generally considered to have its diameter one eighteenth part thicker than a corresponding string covered with silver-wire. As it is necessary to have an E of half a millimetre in diameter to meet a G with the exceptional thickness of a whole millimetre, and as it must be borne in mind that the E will become in reality too thin if the G be taken much thinner, the conclusions arrived at are that the normal proportion for a correct stringing of the violin which has been hitherto indefinite, is not too far remote from the above mentioned proportions which may be summed up as follows: E = $\frac{1}{2}$, A = $\frac{3}{4}$, D = $1\frac{1}{8}$, G = 1 millimetre, or expressed in decimal fractions :

On Stringing.

E = 0.5
A = 0.75
D = 1.125
G = 1.0

These conclusions may all the more readily be accepted having regard to the fact that the above proportions have proved to be equally fitting for instruments of quite different construction. Indeed they apply equally well to a Guarnerius, a Stainer or a Stradivarius.

So far concerning the violin. We will now pass over to the other instruments.

Viola.

If we take the A of a *viola* at 0.75, the D would be = 1.125, G = 1.0 and C = 1.5 or, if the same be expressed in vulgar fractions, A = $\frac{3}{4}$, D = $1\frac{1}{8}$, G = 1, and C = $1\frac{1}{2}$ millimetre, and, consequently, when, for instance, the A of a *violoncello* has a thickness of *one* millimetre, D would be = $1\frac{1}{2}$, G = $1\frac{1}{3}$, and C = 2 millimetres.

Violoncello.

On Stringing.

Contra-basso.

With the *contrabasso* the proportion is different for the reason that its strings are tuned *in fourths*, and therefore the relative thickness of the uncovered strings would adhere to 4 : 3, whilst the uncovered strings of those instruments tuned *in fifths* would adhere to 3 : 2. Therefore, if the G of a contrabasso is taken as three millimetres thick, the D must be = 4 and A (uncovered) = $5\frac{1}{3}$. The thickness for the E is gained as follows :—

We have seen that the G of a violin must be as thick again as the E, the C of a viola as thick again as the A ($2 \times \frac{3}{4} = 1\frac{1}{2}$) and the same obtains with the C of the violoncello which must be as thick again as its A ($2 \times 1 = 2$).

Considering now a contrabasso tuned instead of in fourths: E, A, D, G, in *fifths*, like the violoncello, C, G, D, A, (of course one octave lower *and strung*

On Stringing.

accordingly), the D would remain and retain its thickness of 4 millimetres; the lower strings would have to be thicker than in the usual case and the higher one thinner. In consequence the A (now the highest string) would have $2\frac{2}{3}$ millimetres in thickness and the C, as before mentioned, be as thick again as the A, viz., $5\frac{1}{3}$ millimetres. But as the lowest string of the Contrabasso tuned *in fourths* is not C, but a major third higher (E), and when in playing the octave, the half of a string only sounds, for the fifth $\frac{2}{3}$, for the fourth $\frac{3}{4}$ and for the third $\frac{4}{5}$ of the whole length of a string, *we have to imagine one fifth part of the C omitted*, naturally not from the length but, what arrives at the same result, from the thickness of this string, and therefore we get the thickness of E at $4\frac{4}{15}$ millimetres.

If the A is covered, which some

On Stringing.

players prefer, its diameter must then be, as that of the higher fourth of E, again $\frac{3}{4}$ of the thickness of the E, viz., $3\frac{1}{5}$ millimetres. Consequently the relative proportion of strings for the contrabasso with a G of three millimetres diameter is: E = $4\frac{4}{15}$, A $\begin{matrix}\text{covered} = 3\frac{1}{5} \\ \text{uncovered} = 5\frac{1}{3}\end{matrix}$, D = 4 and G = 3 millimetres.

Absolute thickness.

The *absolute* thickness of the strings of a bow-instrument may be accommodated to the stronger or weaker construction of the instrument, the particular manner of its owners playing, or to the special purpose which it has to serve, although greater deviations from a medium thickness of strings than already mentioned can scarcely be adopted; *the corresponding proportion of the strings must in no wise be altered.*

Corresponding proportion.

I will now add a few hints with reference to the strings themselves.

On Stringing.

For the character of a good string there is required not only durability but also a clearness of tone, both of which are obtained in the first place by the good quality of the materials used and secondly by their careful preparation and finish especially for *perfection in fifths*. The latter is *only* gained when the strings form perfectly homogeneous cylinders. If the strings be in themselves equal, they will be also perfect in fifths. This is not dependent either on the thickness of each single string or on their relation to each other, both of which conditions are here not at all material. I have frequently met with contrary opinions on this subject which rest on erroneous presumptions.

Perfection in fifths.

It is not easy to manufacture strings positively perfect in fifths, and about 30 years ago it was considered almost impossible. The first to make such

On Stringing.

strings was Weichold, in Dresden. At the present time strings perfect in fifths are to be found at various manufactories.

For my own use I procure such strings (covered and uncovered) of excellent quality and in *every variety* of *measure* that can be desired, from Mr. F. Jühling, string-manufacturer, Dresden.

Once more I will give the proper thickness of strings, of which I have previously spoken.

Relative measures of Strings.

For Violin:

G = 1, D = $1\frac{1}{8}$, A = $\frac{3}{4}$, E = $\frac{1}{2}$ millimetre.

For Viola:

C = $1\frac{1}{2}$, G = 1, D = $1\frac{1}{8}$, A = $\frac{3}{4}$ millimetre.

For Violoncello:

C = 2, G = $1\frac{1}{3}$, D = $1\frac{1}{2}$, A = 1 millimetre.

On Stringing.

For Contrabasso :

E = $4\frac{4}{15}$, A $\begin{matrix}\text{covered} = 3\frac{1}{5} \\ \text{uncovered} = 5\frac{1}{3}\end{matrix}$, D = 4, G = 3 millimetres.

Whoever strings his instrument according to those simple rules (provided that the instrument itself is in proper order) will be most pleasantly surprised by the fullness and equality of tone produced.

In reference to the *viola* I wish still to remark, that in general the application of thinner strings is to be recommended rather than those above mentioned. Thus in dividing a millimetre into twenty grades, the C = 28, G = $18\frac{2}{3}$, D = 21 and A = 14, or still thinner, the C = 26, G = $17\frac{1}{3}$, D = $19\frac{1}{2}$, A = 13.

For *violin*, in dividing a millimetre into twenty grades, *thicker* sets of strings would be :

G = 21, D = $23\frac{5}{8}$, A = $15\frac{3}{4}$, E = $10\frac{1}{2}$, or G = 22, D = $24\frac{3}{4}$, A = $16\frac{1}{2}$, E = 11 ; *thinner ones :*

On Stringing.

G = 19, D = $21\frac{3}{8}$, A = $14\frac{1}{4}$, E = $9\frac{1}{2}$, or G = 18, D = $20\frac{1}{4}$, A = $13\frac{1}{2}$, E = 9.

Measuring.

For measuring strings there are different appliances; a specially accurate one is a micrometrical screw-measure which can be had everywhere with various divisions (also 1 millimetre = 20). Through the medium of C. A, Klemm's Hof-Musikalienhandlung, Leipzig, Dresden and Chemnitz, a

Gauge.

gauge is now to be obtained, which is constructed in the *usual* form, but shows an exact division in *grades of millimetres* (1 millimetre = 20).

This gauge, constructed by E. O. Richter & Co. (Reisszeug-Fabrik), in Chemnitz, is to be found in two kinds, one for violin, viola and violoncello, the second for contrabasso, and can also be had direct from the makers.

III.

Strings.

In the foregoing pages the relative proportions of the strings have been spoken of. I will now enter more fully upon the strings themselves.

Manufacturing.

For manufacturing thin strings equally perfect in fifths, it is needful that the proper thin material be procured at the outset, because grinding too much off the strings injures their durability and sometimes even destroys it.

All manufacturers of strings perfect in fifths can also naturally find the fitting material to make thin strings.

At the same time I advert to the fact that for the special manufacturing of thin E-strings which are perfect in fifths, German strings produced from

Strings.

Russian, English and Danish raw material are the best, whilst for the A and the D and also as a base for covered strings Italian material is to be preferred.

Putting on.

In putting on the strings great care must be taken that they do not become untwisted. The A-and D-strings may be supplied with a double knot at the tail-piece.

For drawing the strings through the pegs a pair of tweezers will be found to be the best instrument. The E must first of all be provided at the under end with a sling which has to be put from above into the aperture made for the purpose in the tail-piece in such a manner that the sling remains turned towards the bridge. After this draw the other part of the string through this sling and through the peg and then stretch the string. By this method the E will be kept so firm that in the

Strings.

event of breaking the string cannot snap out of the tail-piece and will thus prevent, what so often happens, a deep impression being made on the roof.

The G-string has to be put up in the same manner as the A and D, but with this difference that a knot need not be tied, as it is already there, left by the act of covering the string. Concerning the fastening of the G-string in the peg I have spoken already (page 10).

The placing under of the ends of A- and E-strings at the pegs must be done from the right to the left, the placing under of the D-string from the left to the right. The ends of the strings must never be permitted to stand out, they must be cut off after the strings have been drawn up. The method frequently applied for economy's sake of winding the superfluous end of the

Strings.

E-string round the scroll or head of the violin is not advisable. Also the unscrewing of the strings after playing, which plan is sometimes recommended in the publications of former years, must be carefully avoided, not only on account of the strings, but also on account of the violin; the reasons are that, on the one hand, the strings, after screwing them on again, will never keep in tune, and, on the other hand, the tension of all parts of the violin will vary continually.

Oiling.

As for oiling the strings, it is best to take clear olive-oil for that purpose. If the strings, *i.e.*, the A, E and D-strings are treated carefully and kept in a tin box in a dry place, they will seldom require oiling. It is generally the best to oil these strings (if really necessary) only just before drawing them up on the instrument, and to wipe them directly after the oiling

Strings.

with a suitable linen cloth. Should the strings have become at all moist, they must first be perfectly dry again before they can be oiled. Players must be cautioned against having too large a supply of strings, as they are apt to become dry, even quite spoiled, if kept too long unused.

With reference to G-strings there is a widely spread opinion that covered strings ought not to be oiled, but, speaking from experience, I maintain that they need occasional oiling quite as much as uncovered strings, in fact they are more exposed to dryness than uncovered strings, owing to their generally not having to be so frequently replaced by new ones. The wire will not easily loosen if a covered string has been properly prepared before being overspun, if it has also been sufficiently stretched and the wire put firmly round it; nevertheless, unloosen-

Strings.

ing will occur in the course of time to strings even of the best quality. In this case the strings must be taken off the violin, then oiled sufficiently and allowed to remain in that state for one night. The next morning the string must be cleansed from the oil which has not been absorbed, it will then be as good as it was previously, possibly even more soft in tone, and it will be suitable for use for a long time. But if the wire has been moved out of its place then another string must of course be substituted.

Treatment of new covered strings.

New G-strings and covered strings altogether are at first rather stubborn with regard to a light and easy sound. This can be remedied by carefully rubbing such strings with pulverised pumice-stone with a linen cloth which has been moistened with oil. In this way any roughness will be rubbed off and the string will sound like one

Strings.

which has been played upon for a long period.

This slight friction with the pulverised pumice-stone, which in no wise alters the thickness of the string, can only be attempted with strings covered with silver-wire; copper-strings "plated with silver" cannot bear this, as by such rubbing the strings will become red, that is, they will lose the coating of silver and display the copper foundation. If copper-strings are desired it is better to take them at once in their original state without any silvering. Such strings sound extremely soft, but naturally do not keep so clean as silver-strings. Hart remarks in his well-known work on violins that there are some instruments which sound well only with copper-strings and there are others which can bear only silver-strings. My own experiments do not bear this out,

Silver- and copper-Strings.

Strings. on the contrary, I have found that silver-strings, properly rubbed off, always sound the best, especially when they are covered with very thin, pure silver-wire. In manufacturing *thick* covered strings also a thin wire must be used. If a thicker string is required it must be got by using a thicker base, *not* a thicker wire; not only on account of securing an agreeable sound but also with regard to a prompt tone. I have never found that a violin loses in brilliancy of sound by the above-mentioned rubbing of the G-string, neither is it within my experience that this will be the case when using *uncovered* strings which are specially prepared to be perfect in fifths. I am, however, aware that this is contrary to the opinion maintained by some.

Cleaning. In order to clean dirty strings they should be carefully rubbed with a linen cloth which has been dipped in a little

Strings.

olive-oil. In case it is not desirable to take the strings from the instrument a soft cloth may be placed between the strings and the fingerboard in such a way that no oil may touch the violin. In this case it is better to rub only from the nut to the end of the fingerboard as the parts of the strings which are touched by the bow have less need of cleaning, and the oil easily smears those parts which are covered with the dust of rosin.

If much of this dust has accumulated firmly on the strings, it can be removed by the application of a little sulphuric ether.

Rosin.

In every way it is best to use a rosin from which all smeary substances have been separated. Such rosin also will not cause the hair of the bow to become dirty.

The firm of F. Jühling, in Dresden, has introduced a very practical rosin-box. It is well adapted for removing

Rosin.

many inconveniences hitherto inseparable from the use of rosin.

Cleaning of the Instrument.

I have already remarked that it is of the greatest importance to keep an instrument always perfectly clean.

The exterior can easily be cleaned by a soft old silk or linen duster, and a soft brush such as those used by a house-painter.

Instruments that are soiled on the outside are very simply cleaned with lukewarm water. A soft cloth must be used and in rubbing care must be taken to always work round and round and on no account must water be allowed to escape through the sound-holes into the instrument; of course it must be rubbed perfectly dry again.

To use oil or any kind of chemical is decidedly to be avoided, because oil easily penetrates into the wood at those parts which may perhaps be only slightly covered with varnish, or through

Cleaning of the instrument.

the sound-holes and it can never be removed again, and chemical materials affect the varnish.

An exception is to be made with the bridge, which must be cleaned with a small linen cloth which has been dipped in sulphuric ether. Great care must be taken that the varnish of the instrument is entirely untouched by the above named solution.

For the fingerboard simple dusting is generally sufficient; for this purpose a small cloth must be drawn between it and the strings. Should any rosin-dust adhere to the broad side it can be removed with some sulphuric ether as in the case of the bridge.

The interior of a violin must be cleaned by taking some barley and spreading it out on a plate, so that the grains lie singly, then all husks and extraneous substances must be removed until there is about a teacup full of

Cleaning of the instrument.

absolutely clean barley ready for use. Place this on a piece of paper and pour through one of the sound-holes into the violin, then shake it about inside the instrument. Finally turn the violin over and move it from one side to the other until every particle of the barley has fallen out again. All dust and dirt, even that which may adhere to the sound-post, will thus be brought out. So called dust-balls may be taken out with a long pin or needle; but if an instrument is cleaned about twice a year in the manner described such dust-balls will not have had time to form at all.

Salt must not be used instead of barley because the fine grains of salt will easily remain in the violin and cause a tendency to dampness.

Jacob August Otto, of Gotha, in his pamphlet to which I have already referred, recommends the barley to be

warmed a little before being put into the instrument. His son, Carl August Otto-Ludwigslust, recommended me to moisten the barley but only to a very small extent. It is rather difficult to arrive at this minute degree of humidity. I have found that barley, without being specially warmed or damped serves the purpose. But if moistened barley is desired, the grains may be damped and then partially dried.

Cleaning of the instrument.

The *bow* should be drawn with hair in such a manner that the hair when unscrewed (which must be always done before the bow is placed in the case) lies quite even and exactly touches the stick.

Bow.

Hair.

The screw-box in the nut of the bow must be given full play in both directions, from the head to the nut and vice-versa, so that the operator may be able to stretch the hair beyond the usual measure and also to unbend it.

Bow.

Only in this way can full power over the tension of the bow be secured at all degrees of temperature, for, as is well known, when the atmosphere is damp the hair becomes somewhat longer and when it is dry a trifle shorter.

Ferrel.

The ferrel itself must from time to time be rubbed with some dry soap (not with oil) so that it may always turn easily. For cleaning the ferrel and the screw-box a little spirits of wine ought to be used.

Nut.

Lapping.

The nut must fit exactly, and for the lapping of the bow copper-wire should never be used as this will soon become very dirty and encourages verdigris.

Cleaning of the garniture.

When the silver or argentine garniture of the nut has become tarnished, it is best to clean it with some spirits of sal-ammoniac, which can be mixed with water. For polishing it is advisable to use a soft piece of washleather,

Bow.

of course the application of a suitable polishing powder is equally to be recommended; but in all things great precaution must be employed.

Cleaning of the hair.

Should it be necessary to wash the hair it is advisable to take some tepid soap-water for this purpose and afterwards to rinse it with pure cold water. In doing this, special attention must be paid to the nut, in order that it may remain dry. After having absorbed as much of the water as possible into a linen cloth, one must never hang the bow to dry near a heated stove, because the stick will easily bend; should the stick be no longer straight, or should it have lost its proper elasticity, a clever instrument-maker will again adjust it over a spirit-lamp.

Adjusting and cleaning of the stick.

The little plate at the head of the bow must be cleaned with water or sulphuric ether. As for the stick and the head it will suffice to clean them

Bow.

with water in the same way as the violin is cleaned. If the stick is often wiped with a soft cloth, it will keep in order a long time without needing to be cleaned by moist rubbing and drying again, provided that a good rosin has always been used. But if it has become particularly dirty, instead of water a mixture of spirits of wine and linseed-oil in equal quantities well shaken together in a bottle will be found the best for cleaning as well as polishing it. It must not be polished too long with this liquid, but must be quickly dried again by rubbing with a piece of soft linen or with an old silk handkerchief. If the application of water proves insufficient, after the washing and drying a little linseed-oil without spirits of wine may be used for rubbing; this will cause the stick to regain its original polish which may have become tarnished.

Case.

The *case* for the instrument should be made both strong and firm, even if it should, in consequence, be somewhat heavy.

Interior fittings.

For the fittings of the interior, wood is to be recommended, covered with cloth, baize, or velvet; but cardboard (if strong) may perhaps be preferred because it is much lighter.

Securing the bow.

The arrangement for securing the bow in the lid of the box is often very insufficient, especially in cheap cases. The bow must lie free, not at all squeezed or pressed, but perfectly firm. The violin must fit exactly into the case, but it is to be recommended in making the form to give enough space at the sides of the centre, because violinists are generally accustomed, when taking the instrument out of the case, to hold it first by the neck and then to raise it.

Form in the case.

Should the form in the case fit too closely with the violin the under edges of the instrument will

Case.

be in danger of being injured. The best method of taking a violin out of its case it to take hold of the neck and of the tail-piece simultaneously and then lift it up in a straight direction. Then the form may be close fitting at the edges; but if the owner takes these precautions it sometimes happens that another person takes the instrument out of the case, who is, like many violinists, not so careful of his own instrument or of other people's property, and, therefore, it is advisable to have the form of the case in the above mentioned parts somewhat wider. Unless absolutely obliged it is better not to give the instrument out of one's hands, and certainly not to persons who are not violin players or even to those who play only a little, as such people seldom take hold of a violin properly although they desire to be looked upon as connoisseurs. Such

Case.

persons generally press the roof (probably to examine its strength) and by such pressing small cracks are made inside the roof, which are all the more fatal as they are not discovered immediately from the outside.

A violin should generally be held only at the neck, and the prevalent custom of taking it under the arm is rather to be avoided, because the edges of the middle parts only too easily become defaced by this method of handling.

Handle.

In choosing the case, one should be selected with a handle having globular fastenings which are decidedly the most durable.

Lining of the lid.

The lining of the lid should be arranged so that it can be easily taken out, in case the handle should at any time require repairing or replacing. For this purpose it is useful to have the lining of the lid mounted upon thin pasteboard, and this again only slightly glued on at the sides.

Case.

Hinges.

The hinges of the lid should always be made so that when the case is opened, the lid can rest upon them. Also *three* hinges are to be recommended, as being more durable, as well as three fastenings, the centre lock and two side springs or hooks. To substitute for this a band for holding up the lid, as is frequently done even in violin-cases of the best quality, is a bad plan, being dangerous for the instrument, as not only in putting in but also in taking out one can easily touch the band and so cause the lid to fall suddenly. Many instruments have been injured in this way.

Locks.

Spring-locks, in my opinion, are to be preferred to all other kinds of fastening. It is to be observed that so many violinists, from a custom dictated by convenience, do not lock up the case but only shut the springs, and although these generally remain closed, they

Case.

may be opened by any pressure, or a knock, or any other accident. With valuable instruments precaution should be taken to have for the principal fastening a special good lock and key.

Outer cover.

It is further of great importance for the box to have an outer cover made of oil-cloth or specially prepared leather, not only on account of rainy weather, but also because such a cover shelters the case, and thereby the violin, in a desirable manner from all changes of temperature.

When the outside of the case has been made specially delicate, it can only be of advantage to the instrument on account of the greater care which is involuntarily taken of the case, and it will be equally beneficial to the violin if the inside of the case is kept perfectly free from every particle of dust.

Cover for the violin

The cover for the violin must be long enough to cover the head and the

Cover.

whole of the instrument; otherwise it will not fully answer the purpose.

Repairs.

Should repairs be needed, application must be made to a well-qualified, experienced and conscientious violin-maker, who is known to be thoroughly reliable, for in no branch of art has more harm been done by meddling persons than in the building and repairing of musical instruments. Of course in time repairs will be needed, but it is better if this is not too frequently the case, therefore it is advisable for the owner or player to handle his instrument with all care and circumspection not only for the preservation of the same, but also to avoid the necessity of repairs.

Preservation.

For example, the instrument must be put out of the hand when there is anything to be done which draws the attention away from it, such as arranging the music stand, etc. It must also be

Preservation.

protected from injury or friction of any kind and, therefore, must never be left lying about, but always be replaced in its case directly after being used. A fall can prove very fatal to a violin, as is shown by the example of Spohr, who in the last years of his life possessed a Stradivarius which was much injured by a fall.

In transporting the instrument, caution must be exercised especially in the winter time. If the violin has been brought from the cold into the warmth it must have time to accommodate itself to the change of temperature, before being played upon. This is especially necessary for keeping the strings in tune; assistance may be given in this purpose by moving the violin several times up and down, so that the warm air can enter quicker through the sound-holes into the instrument.

Conclusion.

Those who have perused my explanations and hints with attention will have seen, when describing the sound-post as the final chief regulator for the tone of the violin, how very simple the whole is in reality. According to the hitherto prevailing idea the position of the sound-post is an undetermined one, as well as the measure of the strings and the condition of the bridge in respect to its thickness and height, whether of hard or soft material, all of which should be determined and fixed for every single instrument by experiments. By this practice, a wrong system becomes so complicated that in reality it deserves to be looked upon as a great wonder when after frequent experiments an instrument sounds well in the end, but when also by accidental conjuncture the right tone should almost have been gained, the question always remains

Conclusion.

whether the sound might still be "improved," and this will lead again and again to renewed trials, because by the customary treatment of the violin, especially with reference to the stringing (at which the higher strings sound too sharp and the lower ones too weak or rather hollow), a really satisfactory result cannot be obtained. But when, as in cases known to me, such a result has been more or less gained, by nearer examination of the respective instruments I have always found that the treatment which had taken place was on the whole according to the maxims I have laid down in this book.

With special reference to the stringing, probably many people, after having been long accustomed to the wrong kind of stringing, generally in use, and to the disproportion in sound of the different tones arising from it, must first become accustomed to the equal and altogether

Conclusion.

improved sound, which results from a rational stringing, just the same as was the case in the introduction of the "normal pitch." The deeper pitch had at first something strange to the ear; but now scarcely any really musical person can be found, who would not consider the former higher pitch (wherever it may still be retained) as disagreeable to the ear.

As to the equal dividing of the string-pressure upon the bridge and the equal tension upon the roof of the instrument, caused by this, the "unsymmetrical" construction of the violin (in so far unsymmetrical as on the one side it has the bar and on the other the sound-post), is of *no consequence at all*, as the roof alone *without* the bar and sound-post can bear the full pressure of the strings, and in fact only gives way to the pressure up to a certain point.

Conclusion.

This one can already see from the fact, that a very short sound-post, even with the full pressure of the strings upon it, is easily moved and can also fall down. The bar acts as a support as well as the sound-post and, therefore, to gain equality of sound, the sound-post must not press more and also not less against the roof, than the bar is able to do, in giving resistance to the pressure of the strings.